Brüel & Kjær

[redacted]

Service

2635
Vibration Pick-up Conditioning Amplifier

Valid from serial no. 587818

037—0264

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Trouble Shooting

If any faults should occur please check the instrument according to the Adjustment Procedure.

When a fault has been traced and corrected, the voltages and adjustments influenced by the correction must be rechecked. The complete instrument should then be tested to make sure that all basic functions are operative.

The tolerances given in these notes are intended for use as guide for adjustments.

Before correcting any apparent deviation make sure that the measuring instrument has tolerances small enough not to affect the measurement.

Modifications

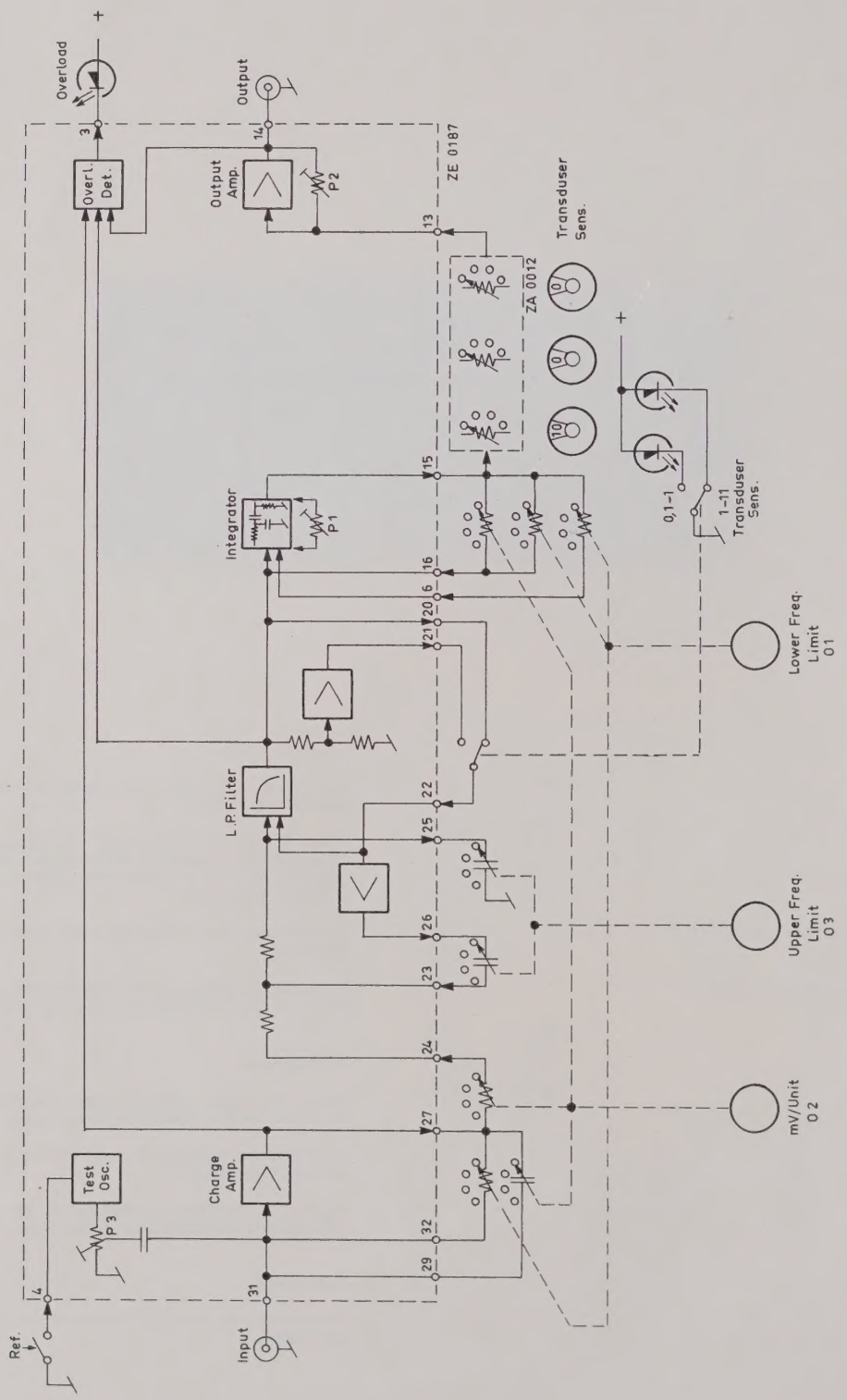
Due to the constant technical progress the instrument will be modified from time to time in order to provide continously improved performance.

For this reason there may be small differencies between the instrument and the Service Instruction.

However, the local Representative Service is in possession of all information regarding the modifications that have been made.

Spare Parts

Please state type and serial number of the instrument when ordering spare parts.

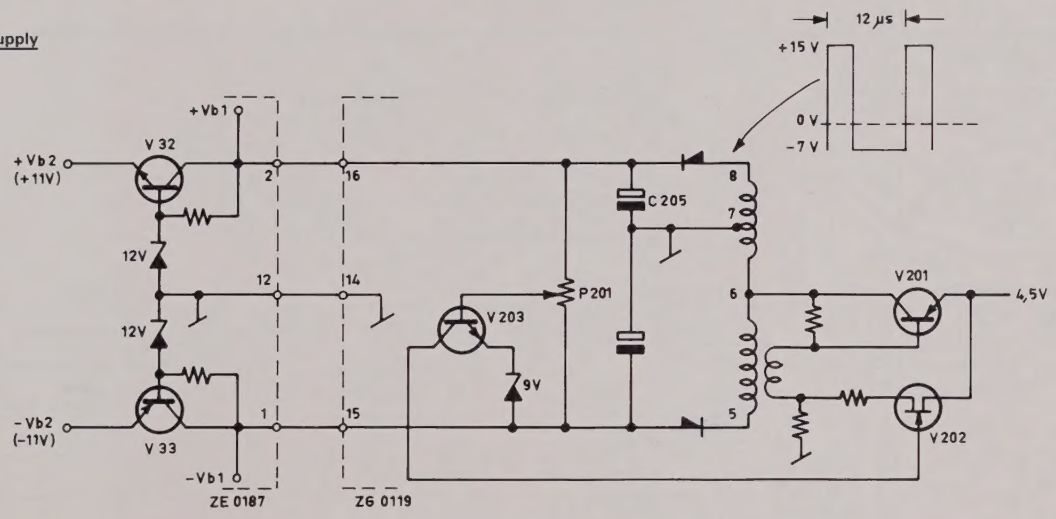


valid from serial no. 587818

The knob setting outlined below is the basic setting and if nothing else is mentioned this setting should be used.

TRANSDUCER SENSITIVITY Attenuators: "1-0-0"
TRANSDUCER SENSITIVITY: "1—11"
mV/UNIT OUT: "10 mV"
LOWER FREQUENCY LIMIT: "Acc. 2 Hz"
UPPER FREQUENCY LIMIT: "100 kHz"

Power Supply



Current Consumption

Supply the amplifier with new batteries.

The current consumption can be checked by connecting a mA meter accross the On-Off switch while the switch is switched Off.

The consumption is approx.: 50 mA

When the button "Ref." is pushed the consumption is approx.: 65 mA

DC voltage

Check the voltage on emitter of V 33 (—Vb2, ZE 0187): —11 V ± 0,6 V

Check the voltage across V33 : 2 V
If necessary adjust P 201

Check the voltage on emitter of V 32 (+ Vb2, ZE 0187): 11 V ± 0,6 V

Check the voltage across V 32 : approx. 2 V

Amplifier

Off-set

mV/UNIT OUT to "0,1"
LOWER FREQ. LIMIT to "Acc. 0,2"

Measure the voltage on terminal 27 (ZE 0187): 0 mV DC ± 25 mV

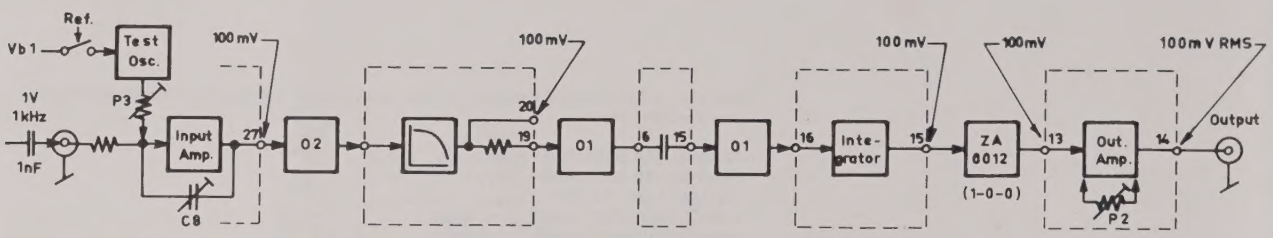
Adjust the voltage on "Output" socket to 0 V by means of P 1.

mV/UNIT OUT to "1000"

Check that the off-set voltage do not change more than 40 mV negative. No adjustment.

Gain

Apply an input signal from a sine wave generator through a 1 nF 1% capacitor (f. inst. CT1148) mounted inside a JP 0028.



mv/unit out to ".1"

Adjust the input signal to 1 V RMS at 1 kHz and adjust the output voltage to 100 mV RMS by means of P 2.

TRANSDUCER SENS. Attn. to "10-0-0"
mV/UNIT OUT to "1000"

Decrease the input voltage by 20 dB and adjust C 8 to 1 V RMS on "Output" socket.

40dB

EXACT

TRANSDUCER SENS. to "0,1-1"
mV/UNIT OUT to "100"

Check the output voltage: 1 V RMS

+1% +1%+1%

C8 ON MV/UNIT SWITCH

Integrator

Check the integrator according to the scheme below.

Input voltage: 100 mV RMS.

1—11

TRANSDUCER SENS. Attn. to "10-0-0"
mV/unit "10"

Input frequency	1,6 Hz	16 Hz	160 Hz	1,6 kHz	Tol.
Accl. 0,2 Hz or 2 Hz	100 mV RMS	100 mV RMS	100 mV RMS	100 mV RMS	0,1 dB
Vel. 10 Hz		100 mV RMS	** 100 mV mV RMS	* 100 mV RMS	0,3 dB
Vel. 1 Hz	1 V RMS	100 mV RMS	** 100 mV RMS	* 100 mV RMS	0,3 dB
Displ. 1 Hz (10 Hz)		100 mV RMS	* 100 mV RMS	** 1 mV RMS	0,3 dB
Displ. 1 Hz	1 V RMS	10 mV RMS	** 10 mV RMS		0,3 dB

* mV/UNIT: "1000"
** mV/UNIT: "100"

Upper Freq. Limit

Input voltage: 1 V RMS

TRANSDUCER SENS. Attn. to "10-0-0"

Check that the output voltage drops 1 dB at the cut off frequency according to the UPPER FREQ. LIMIT knob.

Check also UPPER FREQ. LIMIT in position "> 100" with an input frequency of 200 kHz and check that the output voltage drops —3 dB.

Overload

Apply 1 kHz signal to "Input".

Increase the input voltage and check that the "Overload" indication lights up before the output signal is distored. Output voltage approx. 16 V pp.

Test oscillator

Remove the input signal and push the bottom "Ref."

Output voltage on "Output" socket: 1 V RMS ± 10 mV
If necessary adjust P 3.
Output frequency: 160 Hz ± 2 Hz
No adjustment.

Noise

The instrument should be mounted with side-, bottom- and top-plates.

TRANSDUCER SENS. Attn. "10-0-0"

Mount the screened plug for the BNC input socket and short circuit JP 0028.

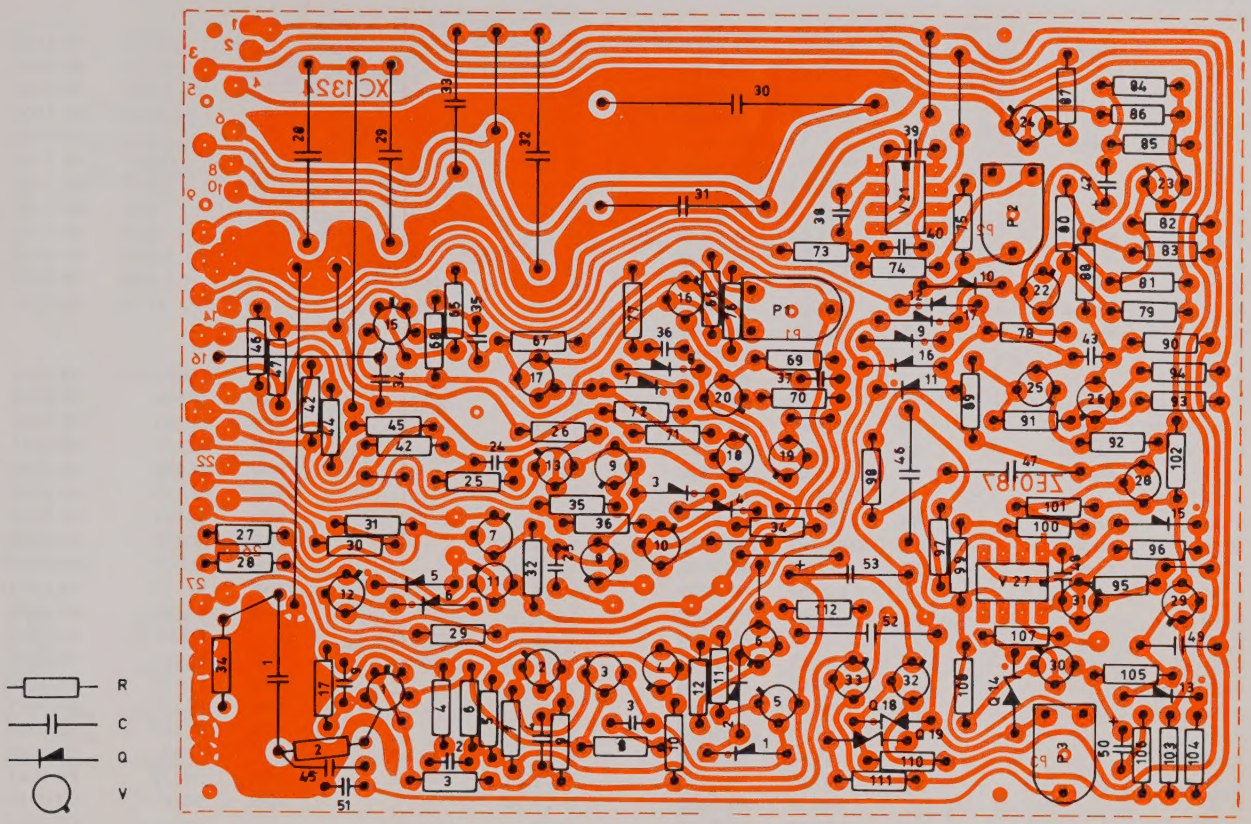
Check the noise according to the scheme below.

The noise should be measured with an electronic voltmeter with a frequency range of 2 Hz — 200 kHz.

mV/Unit	Transducer Sens.	Lower Freq. Limit	Noise Voltage
10	1—11	Accl. 0,2 Hz	50 µV
10	0,1—1	Accl. 0,2 Hz	200 µV
100	1—11	Accl. 0,2 Hz	200 µV
1000	1—11	Displ. 1 Hz	< 0,6 mV

Layout Diagram with Parts List

ZE 0187



Viewed from the component side

C 1	Polyester	0,22 µF/100 V	CS 0339	C 53	Electrolytic			22 µF/2,5 V	CE 2002
C 2	Ceramic	470 pF/400 V	CK 2470	C 55	Tantalum			15 µF/ 16 V	CF 0028
C 3	-	10 pF/400 V	CK 1100						
C 4	-	47 pF/400 V	CK 1471						
C 9	-	22 nF/ 40 V	CK 4220	P 1	Trimmer	Cermet	lin.	2,2 kΩ	PG 2207
C 24	-	18 pF/400 V	CK 1180	P 2	-	-	-	470 Ω	PG 1504
C 25	-	470 pF/400 V	CK 2470	P 3	-	-	-	22 kΩ	PG 3221
C 28	Polyester	6,8 µF/ 63 V	CS 0396						
C 29	-	0,68 µF/ 63 V	CS 0353						
C 30	-	3,3 µF/100 V	CS 0345	Q 1-13	Si.	1N4148		75 V/75 mA	QV 0216
C 31	-	0,33 µF/100 V	CS 0340	Q 14	Zener	ZG6,8		6,0-7,5 V/250 mA	QV 1106
C 32	Polystyrene	120 nF/ 63 V	CT 1525	Q 15-17	Si.	1N4148		75 V/75 mA	QV 0216
C 33	-	12 nF/ 63 V	CT 1514	Q 18,19	Zener	ZPD12		11,4-12,7 V/25 mA	QV 1351
C 34	Ceramic	2,7 pF/400 V	CK 0270						
C 35	-	220 pF/400 V	CK 2222						
C 36	-	30 pF/400 V	CK 0105	R 1	Carbon	1/4 W	5%	39 Ω	RB 1390
C 37	-	47 pF/400 V	CK 1471	R 2	Metal	-	1%	2 kΩ	RF 3200
C 38	-	150 pF/400 V	CK 2151	R 3	-	-	-	32,4 kΩ	RF 4324
C 39	-	3,3 pF/400 V	CK 0330	R 4	Carbon	-	5%	100 Ω	RB 2100
C 40	-	30 pF/400 V	CK 0105	R 5,6	Metal	-	1%	12 kΩ	RF 4121
C 42	Tantalum	2,2 µF/ 35 V	CF 0022	R 7	-	-	-	2,67 kΩ	RF 3267
C 43	Ceramic	220 pF/400 V	CK 2222	R 8	Carbon	-	5%	1 kΩ	RB 3100
C 45	Polystyrene	27 pF/ 63 V	CT 0503	R 9,10	Metal	-	1%	3,9 kΩ	RF 3392
C 46,47	-	10 nF/ 63 V	CT 1545	R 11,12	Carbon	-	5%	12 Ω	RB 1120
C 48	Ceramic	30 pF/400 V	CK 0105	R 17	Metal	-	1%	15 kΩ	RF 4150
C 49	Polyester	0,1 µF/100 V	CS 0409	R 25	-	-	-	18 kΩ	RF 0030
C 50	Tantalum	3,3 µF/ 16 V	CF 0014	R 26	-	-	-	2 kΩ	RF 3200
C 51	Ceramic	22 nF/ 40 V	CK 4222	R 27,28	Carbon	-	5%	12 Ω	RB 1120
C 52	Tantalum	22 µF/ 15 V	CF 0042						

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
R 29	Metal	1/4 W	1%	51,1 kΩ	RF 4511
R 30	-	-	-	4,64 kΩ	RF 3464
R 31	-	-	-	9,31 kΩ	RF 3931
R 32	-	-	-	6,04 kΩ	RF 3604
R 33	Carbon	-	5%	100 Ω	RB 2100
R 34	-	-	-	39 kΩ	RB 4390
R 35,36	-	-	-	12 Ω	RB 1120
R 37	-	-	-	220 Ω	RB 2220
R 42	Metal	-	1%	5,11 kΩ	RF 3511
R 43,44	-	-	-	82,5 kΩ	RF 4825
R 45	-	-	-	14,7 kΩ	RF 4167
R 46	Carbon	-	5%	390 kΩ	RB 5390
R 47	Metal	-	1%	21,5 kΩ	RF 4215
R 65	-	-	-	32,4 kΩ	RF 4324
R 66,67	-	-	-	12,1 kΩ	RF 4121
R 68	Carbon	-	5%	1 kΩ	RB 3100
R 69,70	Metal	-	1%	3,9 kΩ	RF 3392
R 71,72	Carbon	-	5%	12 Ω	RB 1120
R 73	Metal	-	1%	1 kΩ	RF 0296
R 74	-	-	-	9,76 kΩ	RF 3976
R 75	Carbon	-	5%	100 Ω	RB 2100
R 76	Metal	-	1%	348 kΩ	RF 3348
R 77	Carbon	-	5%	1 kΩ	RB 3100
R 78	-	-	-	2,2 MΩ	RB 6220
R 79	-	-	-	56 kΩ	RB 4560
R 80	-	-	-	100 kΩ	RB 5100
R 81	Metal	-	1%	12,1 kΩ	RF 4121
R 82	-	-	-	5,76 kΩ	RF 3576
R 83	Carbon	-	5%	390 kΩ	RB 5390
R 84	-	-	-	47 kΩ	RB 4470
R 85	-	-	-	56 kΩ	RB 4560
R 86	-	-	-	47 kΩ	RB 4470
R 87	-	-	-	330 Ω	RB 2330
R 88	-	-	-	330 kΩ	RB 5330
R 89-91	-	-	-	100 kΩ	RB 5100
R 92	Metal	-	-1%	10 kΩ	RF 4100
R 93	-	-	-	4,22 kΩ	RF 3422
R 94	Carbon	-	5%	890 kΩ	RB 5390
R 95	-	-	-	33 kΩ	RB 4330
R 96	-	-	-	180 kΩ	RB 5180

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
R 97,98	Metal	1/4 W	1%	100 kΩ	RF 5100
R 99	-	-	-	4,42 kΩ	RF 3442
R 100	Carbon	-	5%	1,5 kΩ	RB 3150
R 101,102	-	-	-	100 kΩ	RB 5100
R 103	-	-	-	10 kΩ	RB 4100
R 104	-	-	-	150 kΩ	RB 5150
R 105	-	-	-	10 kΩ	RB 4100
R 106	-	-	-	1 kΩ	RB 3100
R 107	-	-	-	12 kΩ	RB 4120
R 108	-	-	-	4,7 kΩ	RB 3470
R 110,111	Metal	-	1%	2,0 kΩ	RF 3200
R 112	Carbon	-	5%	12 Ω	RB 1120

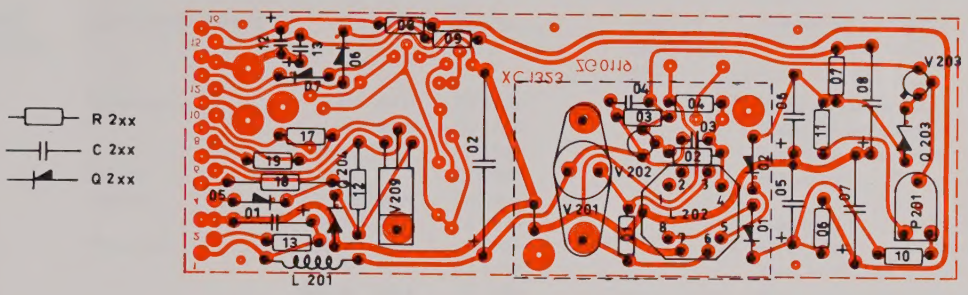
V 1	Dual FET	N	AD00/49	VB 1048
V 2,3	Silicon	PNP	BC179	VB 0100
V 4,5	-	NPN	BC107	VB 0032
V 6	-	PNP	BC177	VB 0071
V 7	-	NPN	BC549	VB 0580
V 8	-	PNP	BC179	VB 0100
V 9	-	NPN	BC107	VB 0032
V 10	-	PNP	BC177	VB 0071
V 11	-	NPN	BC107	VB 0032
V 12	-	PNP	BC177	VB 0071
V 13	-	NPN	BC549	VB 0580
V 15	Dual FET	N	AD00/49	VB 1048
V 16,17	Silicon	PNP	BC179	VB 0100
V 18	-	NPN	BC107	VB 0032
V 19	-	PNP	BC177	VB 0071
V 20	-	NPN	BC107	VB 0032
V 21	Op. amp.		301A	VE 0044
V 22,23	Silicon	PNP	BC177	VB 0071
V 24-26	-	NPN	BC107	VB 0032
V 27	Op. amp.		301A	VE 0044
V 28	FET	N	E102	VB 1052
V 29	Silicon	NPN	BC107	VB 0032
V 30,31	-	PNP	BC177	VB 0071
V 32	-	NPN	BC107	VB 0032
V 33	-	PNP	BC177	VB 0071

Printed Circuit Board	XC 1324

Layout Diagram with Parts List

ZG 0119

Power Supply



viewed from the component side

CIRCUIT DIAGRAM REF.	COMPONENT TYPE			STOCK REF.
C 201	Electrolytic	47 µF/ 10 V		CE 0204
C 202	-	1000 µF/ 16 V		CE 0309
C 203	Ceramic	8,2 nF/ 40 V		CK 3820
C 204	-	47 nF/ 40 V		CK 4470
C 205,206	Electrolytic	22 µF/ 25 V		CE 2002
C 207,208	-	100 µF/ 16 V		CE 0310
C 212,213	Tantalum	15 µF/ 20 V		CF 0010
L 201	Choke	6 µH		LJ 0010
L 202	Converter Coil			LB 0888
P 201	Trimmer	Cermet lin.	22 kΩ	PG 3221
Q 201,202	Si. 1N4148	75 V/ 75 mA		QV 0216
Q 203	Zener ZF9,1	8,5-9,6 V/ 5 mA		QV 1109
Q 204	- ZPD5,1	4,8-5,4 V/ 5 mA		QV 1339
Q 205	Si. 1N4004	400 V/ 1 A		QV 0237
Q 206,207	- 1N4148	75 V/ 75 mA		QV 0216

CIRCUIT DIAGRAM REF.	COMPONENT TYPE				STOCK REF.
R 201	Carbon	1/4 W	5%	33 kΩ	RB 4330
R 202	-	-	-	150 Ω	RB 2150
R 203	-	-	-	33 kΩ	RB 4330
R 204	-	-	-	15 kΩ	RB 4150
R 206,207	-	-	-	12 Ω	RB 1120
R 208,209	-	-	-	22 Ω	RB 1220
R 210	-	-	-	100 kΩ	RB 5100
R 211	-	-	-	39 kΩ	RB 4390
R 212	-	1/3 W	10%	1 kΩ	
R 213	Metal	1/4 W	1%	8,45 kΩ	RF 3845
R 217	Carbon	-	5%	1,2 kΩ	RB 3120
R 218	Wire	4,2 W	-	30 Ω	RX 0309
R 219	Carbon	1/4 W	-	330 Ω	RB 2330
V 201	Germanium	PNP	AD162		VB 0078
V 202	FET	N	NF510		VB 1021
V 203	Silicon	NPN	BC107		VB 0032
V 209	-	-	TIP31		VB 0548
	Printed Circuit Board				XC 1323

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CIRCUIT DIAGRAM REF.	COMPONENT TYPE		STOCK REF.
C 5	Polystyrene	10 nF/ 63 V	CT 1549
C 6	-	1 nF/ 63 V	CT 1170
C 7	-	92 pF/ 63 V	CT 1550
C 8	Trimmer	3-8 pF	CV 0027
C 10	Polyester	150 nF/100 V	CS 0337
C 11	-	15 nF/100 V	CS 0003
C 12	Polystyrene	5,6 nF/ 63 V	CT 1509
C 13	-	1,5 nF/ 63 V	CT 1151
C 14	-	560 pF/ 63 V	CT 1122
C 15	Ceramic	47 pF/400 V	CK 1471
C 17	-	18 pF/400 V	CK 1180
C 18	Polystyrene	270 pF/125 V	CT 1143
C 19	-	820 pF/ 63 V	CT 1121
C 20	-	2,7 nF/ 63 V	CT 1158
C 21	-	8,2 nF/ 63 V	CT 1556
C 22	Polyester	82 nF/100 V	CS 0236
C 26	Ceramic	18 pF/400 V	CK 1180
C 54	Polycarbonate	150 nF/100 V	CS 0337

O 1	Lower Freq. Limit - Unit Out	OH 3060
O 1	Lower Freq. Limit with components	OE 0147
O 2	mVolt/Unit Out	OH 3062
O 2	mVolt/Unit Out with components	OE 0148
O 3	Upper Freq. Limit	OH 3061
O 3	Upper Freq. Limit with components	OE 0149

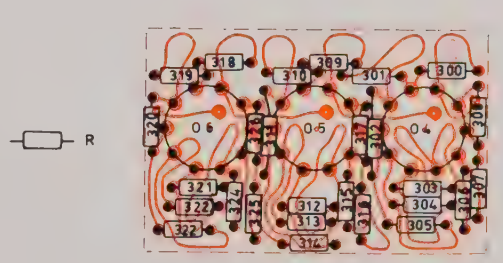
Q 208-210	Sil.	1N4148	75 V/ 75 mA	QV 0216
Q 211-213	LED			QV 4002

R 13	Carbon	1/4 W	20%	18 GΩ	RH 0024
R 14	-	-	-	18 GΩ	RH 0019
R 15	-	-	-	180 MΩ	RH 0018
R 16	-	-	5%	18 MΩ	RH 0908
R 20	Metal	-	1%	4,64 kΩ	RF 3464
R 21	-	-	-	14,7 kΩ	RF 4147
R 22	-	-	-	4,64 kΩ	RF 3464
R 23	-	-	-	2,61 kΩ	RF 3261
R 24	-	-	-	2,15 kΩ	RF 3215
R 50	-	-	-	5,11 kΩ	RF 3511
R 51	-	-	-	51,1 kΩ	RF 4511
R 52	Carbon	1/8 W	10%	1,8 MΩ	RB 6180
R 53	-	1/4 W	5%	1,5 MΩ	RB 6150
R 54	-	-	-	180 kΩ	RB 5180
R 55	-	1/8 W	10%	3,3 MΩ	RB 6330
R 56	-	1/4 W	5%	390 kΩ	RB 5390
R 57	-	-	-	8,2 MΩ	RB 6820
R 58	-	-	10%	12 MΩ	RH 0023
R 59	-	-	5%	1,5 MΩ	RB 6150
R 60	-	-	10%	33 MΩ	RH 0016
R 61	-	-	5%	4,7 MΩ	RB 6470

Moving coil instrument	IM 0011
Miniature socket	JJ 0031
Screened cap for do	YM 0420
BNC socket	JJ 0130
Screened cap for do	DT 0074
DIN socket	JJ 0709
DIN plug	JP 0703
Ground socket	JT 6204

CIRCUIT DIAGRAM REF.	COMPONENT TYPE	STOCK REF.
	Power Source switch	NN 0025
	Power ON/OFF switch	NN 0038
	Transducer sens. switch	NN 0047
	Ref. switch	NT 0040
	Knob (0-9) DD 0089 + SA 0147 +	SN 0030
	Knob (1-10) DD 0089 + SA 0148 +	SN 0030
	Knob, mVolt/Unit, Upper Freq. Limit	SN 2021
	Knob, Lower Freq. Limit - Unit Out	SN 2026
	Battery container	YJ 0399

ZA 0012

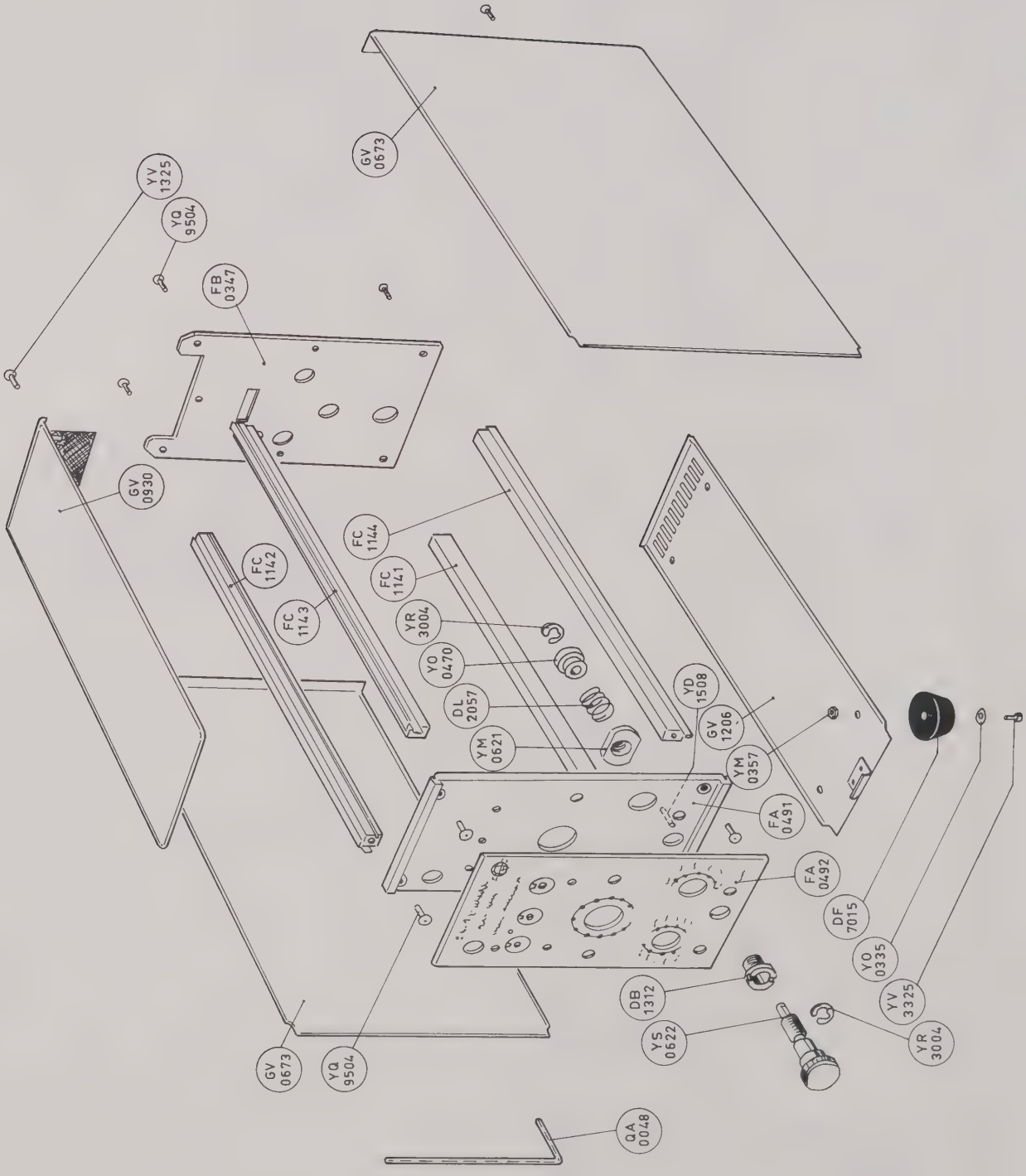


viewed from the printed circuit side

O 4-6	Transducer Sens. switch				OI 0005
R 300-308	Metal	1/4 W	1%	1 kΩ	RF 3100
R 309-317	-	-	-	100 Ω	RF 2100
R 318-326	Carbon	-	5%	10 Ω	RB 1100

Printed Circuit Board	XC 0887

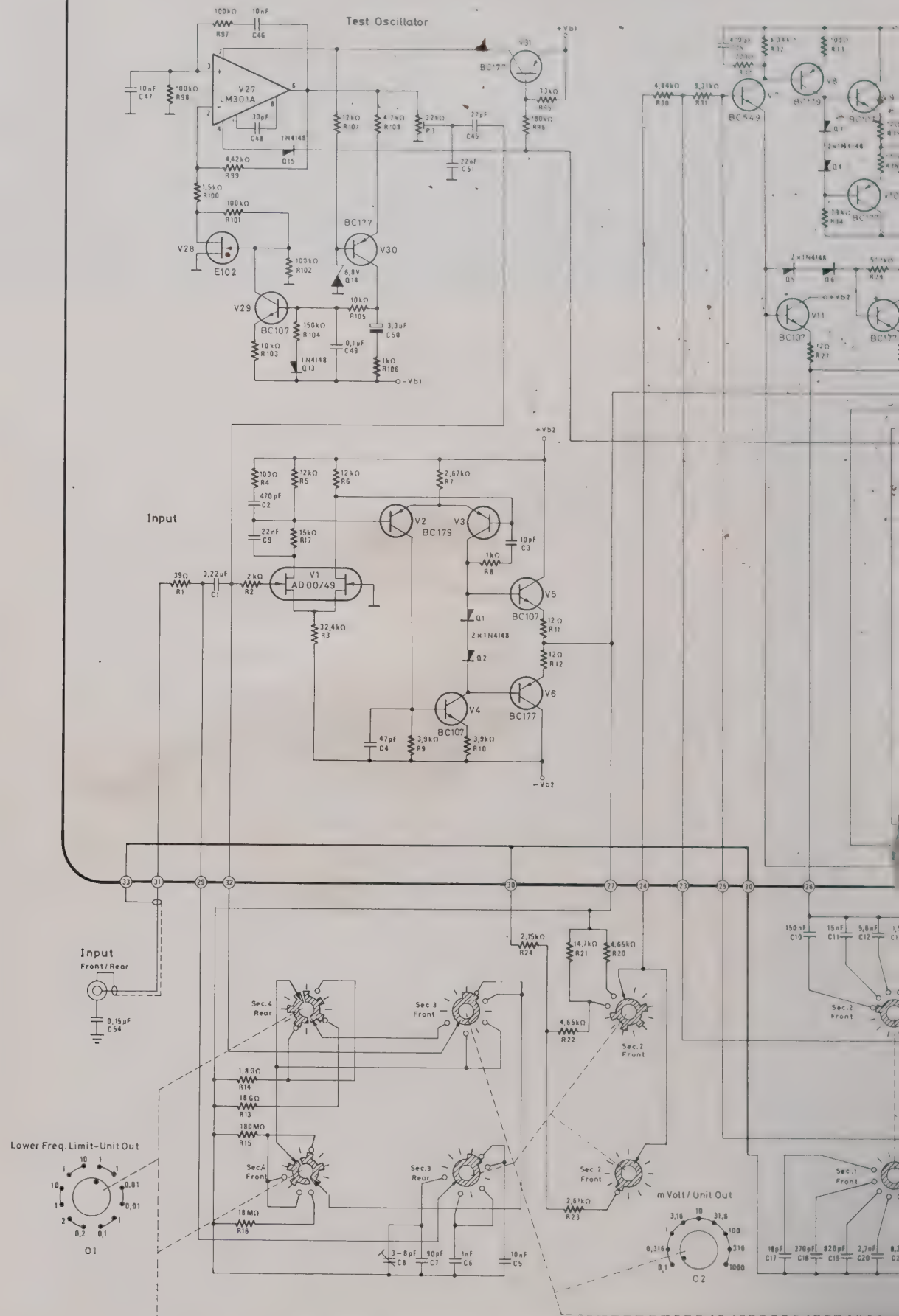
Cabinet Parts



BRÜEL & KJÆR
Nærum - Denmark

Circuit Diagram

2635.3



Overload Detector

Overload

Voltage Regulator

Integrator

Output

Output Front/Rear

Ref.

ZE 0187

ZG 0119
Power Supply

Power Source
Int. + + Ext.view
Bat. – Ext.

ZA 0012

Upper Freq. Limit

Transducer Sens.

Transducer Sens.

LM 301A
Top view

TIP31
B C E

AD162

BC107
BC109
BC177
BC179

E102
NF510
Bottom view

AD 00/49

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